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ABSTRACT

This report offers research and analysis of outcomes for 15,743 students who enrolled in basic skills mathematics classes at Rio Hondo College in California between fall 1996 and summer 2001. The research was done at the request of the basic skills mathematics faculty. Although the California Community College Chancellor's Office defines remedial math as Math 020 and Math 030 only, Rio Hondo includes Math 050 and Math 070 in their definition of basic skills math because they are not transfer-level courses. Counting enrollments rather than individual students, the overall success rate (grades of A, B, C, or CR) for basic skills math was 43%. Course enrollment success rates were 41% at the Math 020 level, 49% at the Math 030 level, 41% at the Math 050 level, and 42% at the Math 070 level. Of the original 5,579 students enrolling in Math 020, 2,068 (or 37%) attempted Math 030, and about 64% of those who attempted that next level succeeded. A total of 1,109 (20%) of the original group attempted Math 050, and their success rate was 55%. Only 382 (about 7%) of the original 5,579 students attempted Math 070. Of those 382, the success rate for Math 070 was 62%. Withdrawals were high because of enrollment requirements for Math/Science Center module courses. Success rates improve markedly for all sections when withdrawals are excluded. (NB)

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Memorandum

Date: February 20, 2002

To: Gisela Spieler-Persad

Leah Griffith

Cc: Gary Curtis, Dean, Math and Science

Stephen C. Maack

From: Stephen C. Maack
Director, Institutional Research

RE: Basic Skills Mathematics Research Report

Introduction. The research and analyses for this report were done at the request of the Basic Skills Mathematics faculty for the AY 2001-2002 Basic Skills Mathematics program review. The results concern 15,743 individual students who enrolled 39,604 times between Fall 1996 and Summer 2001 in one or more Basic Skills Mathematics courses at Rio Hondo College. In addition to enrollments in the regular semester or summer term length courses, the enrollments include those in the Math/Science Center modular courses: MATH 020A, 020B, 020C, 030A, 030B, 030C, 030D, 050A, 050B, 050C, 050D, 070A, 070B, 070C, and 070D. Each of the Math/Science Center courses is done using computer self-instruction, at the pace chosen by the student. In order to count "terms" of instruction, the MATH 020A, 020B, and 020C course modules were each weighted as involving the equivalent of one-third of a term of instruction, and the other Math/Science Center Mathematics courses were each weighted as one-fourth of a term. Since the Math/Science Center courses are self-paced, a student might spend more or less time in a course module than the weighted assumed amount of time of instruction.

"Enrollments" include withdrawals, even if followed by enrollment in another course the same term, but exclude withdrawals that were recorded before the term even started. Students who enrolled and then withdrew from one or more Math/Science Center courses, even if withdrawing immediately, were counted as though enrolled. However, when computing the maximum number of terms enrolled, each term would only be counted once, no matter how many Basic Skills Mathematics enrollments and withdrawals a student might have in that term, or how many separate Basic Skills Math courses were involved.

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EXECUTIVE SUMMARY

- "Basic Skills Math" courses, as used in this report, include not only MATH 020 and MATH 030, but also MATH 050 and MATH 070 (and the related Math/Science Center courses).

- This definition of "Basic Skills Math" differs from the California Community College Chancellor's Office definition (i.e., courses one or more levels below the level needed to obtain an AA or AS degree), which would just include MATH 020 and 030 and the related Math/Science Center courses.

- The overall distribution of enrollments by term and course level has been relatively stable over time, but Fall, and Summer enrollments are very weakly but statistically significantly different from year to year (see Chart 1).

- The significant yearly differences apparently result from: a) the introduction of the Math/Science Center (MSC) courses at all levels, and b) slight increases in enrollments at the MATH 020 and MATH 030 levels in the Fall and Spring terms.

- The bigger enrollment demands are usually for MATH 050 level courses, followed by MATH 030 level courses. MATH 070 level courses attract about as many student enrollments as MATH 020 courses do.

- During the Fall and Spring terms very few people ever chose one of the Math/Science Center A, B, C, or D courses as the first ones they attempted in the research period.

- MSC course modules are more attractive to Summer term students as their first courses. The attractiveness of the computer courses apparently increases as the level of the course (and presumably the capability of the students) increases.

- Chart 2 shows decreases after Fall 1997 in the numbers of students taking MATH 050 or MATH 070 as their first courses. Further research regarding placement levels of cohorts of students would be needed to determine the importance of this trend.

- Counting enrollments (rather than individual students), the overall Basic Skills Math course success rate (for grades of "A," "B," "C," or "CR") was 43 percent. Students were counted more than once for the same course if they enrolled more than once.

- Course enrollment success rates were 41 % at the MATH 020 level, 49 % at the MATH 030 level, 41 % at the MATH 050 level, and 42 % at the MATH 070 level – suggesting equivalent success across the curriculum in teaching and learning (see Chart 3).

- High MSC course withdrawals rates lowered the overall success rate for Basic Skills Math courses. Except for MATH 030A, withdrawal rates for the computer module courses were consistently in the 60 percent to 76 percent range, while those in the term length courses fell in the 24 percent to 34 percent range.

- Reasons for the high MSC course withdrawal rates may include a) administrative procedures that require a student to register in a course by a particular date if he or she wants to attempt that course at any point in the term; and b) tougher criteria for passing MSC course modules than for passing "traditional" semester/term courses.

- Higher, relatively uniform success rates in the term length courses reflect more accurately the experiences of most Basic Skills Math students (MATH 020 at 49 %, MATH 030 at 47 %, MATH 050 at 50 %, and MATH 070 at 49 %).

- Excluding those who withdraw, success rates for all Basic Skills Math courses were 74 percent, with success rates at Math 020 level of 68 %, Math 030 level of 76 %, Math 050 level of 74 %, and Math 070 level of 75 %.

- Excluding withdrawals, the more advanced the difficulty of a MSC module at a particular course level, the greater was the success rate.

- Fewer and fewer students attempt more difficult MSC modules within each level. The more difficult the module within a level, however, the greater the proportion of students attempting it that succeed (up to 90 and 98 %) – provided that the students do not withdraw before the end of the module.

- Even though more students sign up for lower level MSC modules, the combined evidence suggests that the self-guided MSC courses may be best suited to the more adept Basic Skills Math students, within and across Basic Skills Math levels. Self-selection may be occurring in who signs up for the MSC courses.

- Passing a Basic Skills Math level can be achieved by: a) passing the semester or term length course at that level (i.e., MATH 020, 030, 050, or 070); or b) passing all three or all four of the equivalent Math/Science Center computer modules at that level.

- Four statistically significant, moderately strong correlations indicated that students who took just the term length MATH course succeeded at the level more often than: a) those who took a combination of the term length MATH course and one or more of the Math/Science Center self-guided computer courses; and b) those who took only the MSC modules at that level.

- Of the 5,579 individual students who enrolled at the MATH 020 level, 50 % eventually succeeded at that level. The 76 % who took only MATH 020 had a 59 % success rate. The 7 % who took MATH 020 plus one or more MSC courses at that level had a 45 percent success rate at that level. The 17 % who took only MSC modules had an 11 % success rate in passing all three modules at that level.

- Of the 6,249 individual students who enrolled at the MATH 030 level, 62 % eventually succeeded at that level. The 82 % who took only MATH 030 had a 68 % success rate. The 7 % who took MATH 030 plus one or more MSC courses at the level had a 51 % success rate at that level, and the 11 % who took only MSC modules had a 16 % success rate in passing all four modules at that level.

- Of the 6,832 individual students who enrolled at the MATH 050 level, 59 percent eventually succeeded at that level. The 78 % who took only MATH 050 had a 67 % success rate. The 11 % who took MATH 050 plus one or more MSC modules had a 53 % success rate at that level. The 11 % who took only the Math/Science Center courses had only a 12 % success rate in passing all four modules at that level.

- Of the 5,155 students who enrolled at the MATH 070 level, 63 % eventually succeeded at that level. The 82 % who took only MATH 070 had a 70 % success rate. The 9.5 % who took MATH 070 plus one or more MSC modules had a 47 % success rate at that level. The 8 % who took only the Math/Science Center modules had only a 20 % success rate in pass all four modules at that level.

- A weighting methodology was developed to count time spent in Basic Skills Math course and MSC course modules. Each term length Basic Skills MATH course attempt was given a value of 1.0 and each MSC module attempt was given a value of one-third of a term (at the MATH 020 level) or one-fourth of a term (at other Basic Skills Math levels). The methodology counts withdrawals, and re-enrollments in the same term or in another term as weighted attempts. It is a measure of "nominal" rather than "actual" effort at each level.

- Students who succeeded at each level took, on average, 1.20 weighted terms at MATH 020 level, 1.19 weighted terms at MATH 030 level, 1.34 weighted terms at MATH 050 level, and 1.37 weighted terms to succeed at MATH 070 level. On average, students who succeeded in moving from MATH 020 through MATH 070 might need 5.1 terms to succeed at all levels.

- Most students attempted semester/term length courses at each level. Those who took only the semester/term length courses and eventually succeeded averaged 1.13 terms in MATH 020, 1.13 terms in MATH 030, 1.23 terms in MATH 050, and 1.29 terms in MATH 070. On average, these students might succeed at all levels in 4.78 terms.

- Since each Math/Science course enrollment is weighted as 0.25 or 0.33 terms, logically those who took one (or more) regular semester/term length courses at a level, plus one or more Math/Science modules at that level, averaged more weighted terms at each level than those who only took the semester/term length course. The disparity in nominal time (apparent effort) spent at the level is exacerbated by the high withdrawal rates in the Math/Science Center courses.

- At each level, those who did not succeed tried more terms, on average, than those who did succeed. The higher the level at which students were attempting Basic Skills Math, the greater the difference between the average number of terms attempted by those who did not succeed, compared to those who did succeed at that level.

- Students who took only MSC modules at a level averaged fewer weighted terms overall at that level. In addition: a) 80 to 89 % of these students did not succeed at each level, and b) 72 to 78 % at each level attempted too few MSC course modules to pass the level.

- These MSC module phenomena lower the overall difference for all students in nominal terms attempted by those who succeed, compared to those who do not succeed.

- For those few students who were successful at a level while taking only MSC modules, their average weighted time to success was about the same as that of those who took the semester/term length course: 1.20 weighted terms compared to 1.13 terms at the MATH 020 level; 1.18 weighted terms compared to 1.13 terms at the MATH 030 level; 1.24 weighted terms compared to 1.23 terms at the MATH 050 level; and 1.06 weighted terms compared to 1.29 terms at the MATH 070 level.

- Measured using the weighting methodology of this study, only at the MATH 070 level is there a possible nominal time to success advantage gained by taking just MSC modules. Of course, with self-paced instruction the actual time to success is unclear.

- Looking across the sequence of Basic Skills Math courses, 5,579 students took courses at the MATH 020 level, and 50 % succeeded at that level. Of the original 5,579 students, 2,068 or 37 % of the MATH 020 students attempted courses at the MATH 030 level, and about 64 % of those who attempted that next level, succeeded.

- While about 68 % of those who had succeeded at the 020 level continued on to the 030 level, only about 6 % of those who had not succeeded at the lower level attempted Rio Hondo courses at the 030 level.

- While 2,068 of the original 5,579 MATH 020 level students attempted MATH 030 level courses, only 1,109 (20 % of the original group) attempted MATH 050 level courses. The overall MATH 050 success rate of students who had taken MATH 020 and MATH 050 at Rio Hondo during the research period was 55 percent.

- About 93 percent of those attempting MATH 050 had previously attempted both MATH 020 and MATH 030 level courses, and 85 percent had succeeded at both prior levels. The subgroup that had succeeded at both prior levels had a 58 percent success rate at the MATH 050 level.

- About 15 percent of those who were attempting MATH 050 level courses at Rio Hondo had arrived at the MATH 050 level through routes not expected by the usual sequence (i.e., MATH 020 level – MATH 030 level – MATH 050 level, with all courses taken at Rio Hondo and success at prior levels). Students who followed other paths to MATH 050 level had lower success rates, reducing the overall success rate.

- When looking at MATH 070 success, only 382 (about 7 percent) of the 5,579 students who had attempted MATH 020 level at Rio Hondo, attempted MATH 070 level courses here. The success rate at the MATH 070 level of the 382 was 62 %.

- Of the 382, fully 315 (about 83 %) had passed each of the MATH 020, 030, and 050 levels at Rio Hondo College. The success rate at the MATH 070 level of the 315 who had previously passed all prior MATH levels at Rio Hondo College was 64 %.

- Other sequential success experiences were similar. There were 4,181 students who took MATH 030 (but not MATH 020) at Rio Hondo, and 61 % succeeded at the MATH 030 level. About 49 % or 2,043 of the original group also took MATH 050 level courses at Rio Hondo during the study period, and had about a 63 % success rate at the MATH 050 level. The MATH 050 level success rate was slightly higher, 64 %, among the 1,954 who had already succeeded at the MATH 030 level.

- Of the original 4,181 MATH 030 level students, 876 (21 %) attempted MATH 070 level courses at Rio Hondo. The overall success rate for all 876 MATH 070 level students was 68 %.

- Fully 826 or 94 percent of those 876 MATH 070 level students had already succeeded at both MATH 030 and MATH 050 levels at Rio Hondo. The other 50 had followed different patterns before arriving at the MATH 070 level. The success rate for the 826 students who had previously succeeded at the MATH 030 and 050 levels at Rio Hondo was slightly higher, almost 70 %.

- The final sequential success experiences were those of the 3,680 students that did not take MATH 020 or MATH 030 level courses at Rio Hondo during the study period, but did take MATH 050 level courses here. These students had a 58 % success rate at the MATH 050 level. Of the 3,680 students, 1,593 or 43 % also took MATH 070 level courses at Rio Hondo. The overall success rate for those 1,593 MATH 070 level students was 67 %.

- Fully 1,491 or 94 percent of the 1,593 students had previously succeeded in MATH 050 level courses at Rio Hondo College. The success rate for those 1,491 students at the MATH 070 level was 69 %.

- Six hypotheses were tested concerning potential correlations of success at the next Basic Skills Math level with having succeeded in the pre-requisite Basic Skills Math course at Rio Hondo, rather than having taken pre-requisite Math elsewhere. The only notable correlation was weak and statistically significant. Students who took MATH 050 level courses at Rio Hondo were more likely to succeed at the MATH 070 level here than those who had prepared elsewhere. Even that correlation was too weak to consider notable when only the semester/term length MATH 050 and MATH 070 successes were examined. It appeared when the students who took only MSC courses at the MATH 050 and/or MATH 070 levels were included in the correlation statistics.

- Two conclusions may be drawn from this series of hypotheses checks. First, when moving from MATH 020 to MATH 030 levels, or from MATH 030 to MATH 050 levels, or from MATH 050 to MATH 070 levels, students who take the pre-requisite course at Rio Hondo generally succeed as well at the higher level as those who take the pre-requisite course work elsewhere. Second, MSC courses, when taken by Rio Hondo students, do make a difference in success when advancing from the MATH 050 to the MATH 070 levels.

The main part of the report starts immediately below.

Definition of "Basic Skills Math." According to the California Community College, Chancellor's Office, "Basic Skills Mathematics" courses consist of Mathematics courses that are one or more levels below the level needed to obtain an AA or AS degree from a college. At Rio Hondo College, students must pass MATH 050 in order to obtain an AA or AS degree. Under the Chancellor's Office definition, then, "Basic Skills Math" at Rio Hondo consists of just MATH 020 and MATH 030 (and the associated Math/Science Center courses). Neither of these courses is sufficient for receipt of a Rio Hondo AA or AS degree, and neither is transferable to four-year universities as a degree-applicable course.

The Rio Hondo College Mathematics Department, however, uses a different definition of "Basic Skills Math" that takes account of transfer level Mathematics. By definition, transfer level courses at Rio Hondo College are numbered 101 to 298. Under the Mathematics Department definition, then, "Basic Skills Math" courses include not only MATH 020 and MATH 030, but also MATH 050 and MATH 070 (and the related Math/Science Center courses). Since this research is being done in support of a Basic Skills Mathematics program review, the Rio Hondo College Mathematics Department definition, rather than the Chancellor's Office definition, is used throughout this memorandum.

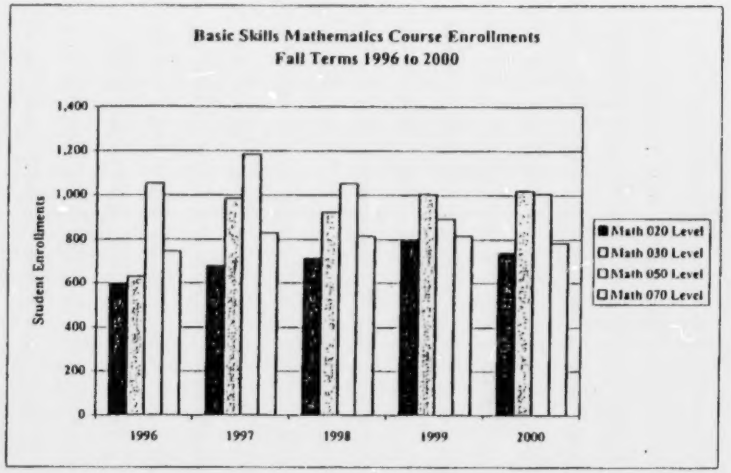
Since details by course level are provided, it is nevertheless possible to apply the results of this research to Chancellor's Office concerns about "Basic Skills Mathematics" by looking just at the MATH 020 and MATH 030 level results.

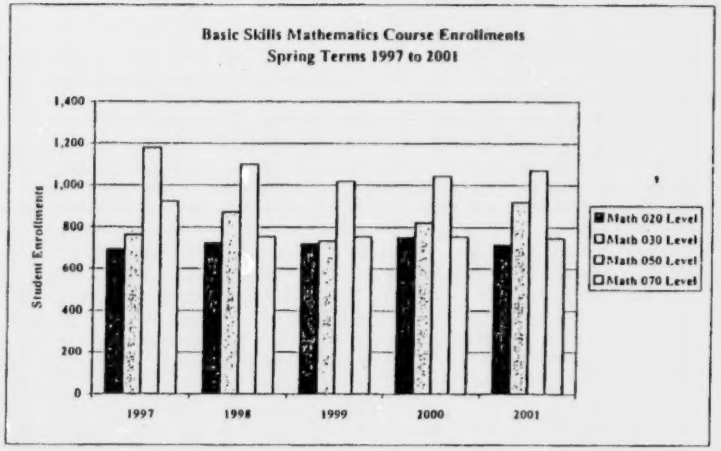
Distributions of Enrollments. During the entire five-year period the 39,604 enrollments were distributed as shown in Chart 1. Fall terms had 21 percent at the MATH 020 level (i.e., MATH 020, 020A, 020B, or 020C), 26 percent at the MATH 030 level (i.e., MATH 030, 030A, 030B, 030C, or 030D), 30 percent at the MATH 050 level (i.e., MATH 050, 050A, 050B, 050C, or 050D), and 23 percent at the MATH 070 level (i.e., MATH 070, 070A, 070B, 070C, or 070D). The total number of enrollments in the Spring terms was almost as large as in the Fall terms. The distribution by level in the Spring is similar to that in the Fall terms, with slightly greater concentrations at the MATH 050 and (to a lesser extent) the MATH 020 levels. The proportion at MATH 030 level declined slightly in the Spring terms (and MATH 070 attracted a stable proportion of all enrollments). Summer term enrollments generally number less than one-third of either the Fall or the Spring term enrollments. The Summer enrollments concentrate a bit more at the extremes – MATH 020 or MATH 070 level courses – with the MATH 030 level represented less than in either of the semester length terms.

The overall distribution of enrollments by term and course level has been relatively stable over time, but Fall, and Summer enrollments were very weakly but statistically significantly different from year to year. The significant differences appear to be the result of two changes during this time period: a) the introduction of the Math/Science Center courses at all levels, and b) slight increases in enrollments concentrated at the MATH 020 and MATH 030 levels in the Fall and Spring terms.

The Fall term series especially indicates the introduction of the Math/Science Center courses (indicated by A, B, C, or D added to the course abbreviation) between Fall 1996 and Fall 1997 – with only MATH 050 A, B, C, and D present in the first fall and all Math/Science Center courses there the following fall. The distributions indicate that students who signed up for

CHART 1
BASIC SKILLS MATHEMATICS ENROLLMENTS
BY COURSE LEVEL AND COURSE
FALL 1996 THROUGH SUMMER 2001





Course Enrollments	Fall Terms 1996	1997	1998	1999	2000	Total	Percents
Math 020 Level	598	679	717	798	742	3,534	20.5%
Math 020	375	426	447	523	507	2,278	13.2%
Math 020A	139	162	148	150	122	721	4.2%
Math 020B	56	52	64	68	65	305	1.8%
Math 020C	28	39	58	57	48	230	1.3%
Math 030 Level	630	984	920	1,004	1,020	4,558	26.4%
Math 030	630	652	649	691	702	3,324	19.3%
Math 030A		154	110	120	134	518	3.0%
Math 030B		74	68	86	91	319	1.8%
Math 030C		61	57	64	56	238	1.4%
Math 030D		43	36	43	37	159	0.9%
Math 050 Level	1,051	1,183	1,053	892	1,006	5,185	30.0%
Math 050	762	725	713	588	649	3,437	19.9%
Math 050A	136	206	138	131	147	758	4.4%
Math 050B	61	112	79	84	94	430	2.5%
Math 050C	53	82	73	51	71	330	1.9%
Math 050D	39	58	50	38	45	230	1.3%
Math 070 Level	746	828	815	817	784	3,990	23.1%
Math 070	746	568	613	603	564	3,094	17.9%
Math 070A		120	87	87	90	384	2.2%
Math 070B		59	47	50	54	210	1.2%
Math 070C		47	39	42	44	172	1.0%
Math 070D		34	29	35	32	130	0.8%
Total Enrollments	3,025	3,674	3,505	3,511	3,552	17,267	100.0%
Percentage by Year	17.5%	21.3%	20.3%	20.3%	20.6%	100.0%	

Pearson Chi-Square = 729.039, df = 72, p < .001, Cramer's V = .103, p < .001

Course Enrollments	Spring Terms 1997	1998	1999	2000	2001	Total	Percents
Math 020 Level	695	726	721	752	717	3,611	21.2%
Math 020	463	499	510	517	442	2,431	14.2%
Math 020A	118	124	108	116	134	600	3.5%
Math 020B	68	62	54	67	72	323	1.9%
Math 020C	46	41	49	52	69	257	1.5%
Math 030 Level	765	871	734	820	918	4,108	24.1%
Math 030	703	568	464	505	522	2,762	16.2%
Math 030A	33	119	109	121	139	521	3.1%
Math 030B	12	82	73	74	115	356	2.1%
Math 030C	9	60	53	62	76	260	1.5%
Math 030D	8	42	35	58	66	209	1.2%
Math 050 Level	1,178	1,101	1,018	1,043	1,073	5,413	31.7%
Math 050	803	729	740	702	723	3,697	21.7%
Math 050A	161	180	123	146	147	757	4.4%
Math 050B	83	87	72	86	96	424	2.5%
Math 050C	69	60	54	64	65	312	1.8%
Math 050D	62	45	29	45	42	223	1.3%
Math 070 Level	922	755	755	755	748	3,935	23.1%
Math 070	729	527	523	507	515	2,801	16.4%
Math 070A	74	106	100	95	105	480	2.8%
Math 070B	47	53	54	56	49	259	1.5%
Math 070C	39	38	45	53	43	218	1.3%
Math 070D	33	31	33	44	36	177	1.0%
Total Enrollments	3,560	3,453	3,228	3,370	3,456	17,067	100.0%
	20.9%	20.2%	18.9%	19.7%	20.2%	100.0%	

Pearson Chi-Square = 414.322, df = 72, p < .001, Cramer's V = .078, p < .001

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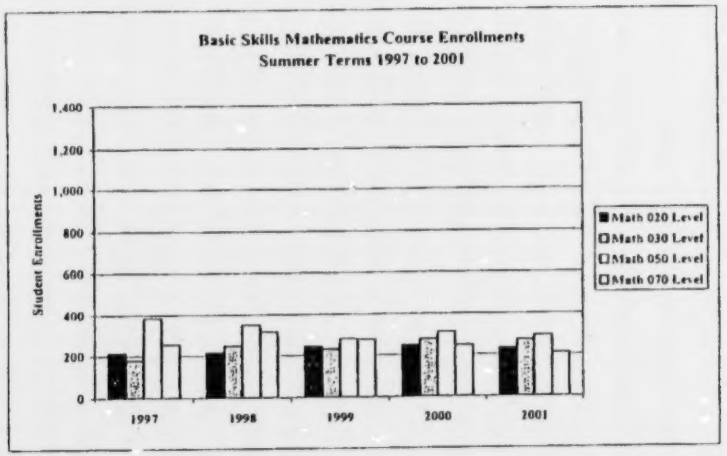
CHART 1
BASIC SKILLS MATHEMATICS ENROLLMENTS
BY COURSE LEVEL AND COURSE
FALL 1996 THROUGH SUMMER 2001



	Summer Terms						
Course Enrollments	1997	1998	1999	2000	2001	Total	Percents
Math 020 Level	214	216	244	246	229	1,149	21.8%
Math 020	150	143	167	174	146	780	14.8%
Math 020A	29	36	40	31	36	172	3.3%
Math 020B	20	21	15	27	23	106	2.0%
Math 020C	15	16	22	14	24	91	1.7%
Math 030 Level	180	247	230	275	271	1,203	22.8%
Math 030	113	104	121	112	108	558	10.6%
Math 030A	39	58	35	52	51	235	4.5%
Math 030B	15	37	38	45	40	175	3.3%
Math 030C	7	30	19	31	34	121	2.3%
Math 030D	6	18	17	35	38	114	2.2%
Math 050 Level	385	350	279	312	294	1,620	30.7%
Math 050	219	193	173	148	131	864	16.4%
Math 050A	76	75	46	59	62	318	6.0%
Math 050B	35	47	31	46	44	203	3.9%
Math 050C	26	22	17	33	33	131	2.5%
Math 050D	29	13	12	26	24	104	2.0%
Math 070 Level	254	317	275	245	207	1,298	24.6%
Math 070	158	137	162	123	137	717	13.6%
Math 070A	75	82	58	54	35	304	5.8%
Math 070B	13	47	23	23	10	116	2.2%
Math 070C	6	25	16	24	11	82	1.6%
Math 070D	2	26	16	21	14	79	1.5%
Total Enrollments	1,033	1,130	1,028	1,078	1,001	5,270	100.0%
	19.6%	21.4%	19.5%	20.5%	19.0%	100.0%	

Pearson Chi-Square = 248.398, df = 72, p < .001, Cramer's V = .109, p < .001

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Math/Science center courses signed up for the "A" course in a sequence up to twice as often as the "B" or later courses. In fact, in every term at every course level there was a monotonic decrease in enrollments as one moves from the "A" course to the "C" or "D" course in the Math/Science Center sequences. These courses nevertheless comprise about one-quarter to one-third of the enrollments at each Basic Skills Math level in the fall and spring terms, and one-third to about one-half of all summer term enrollments.

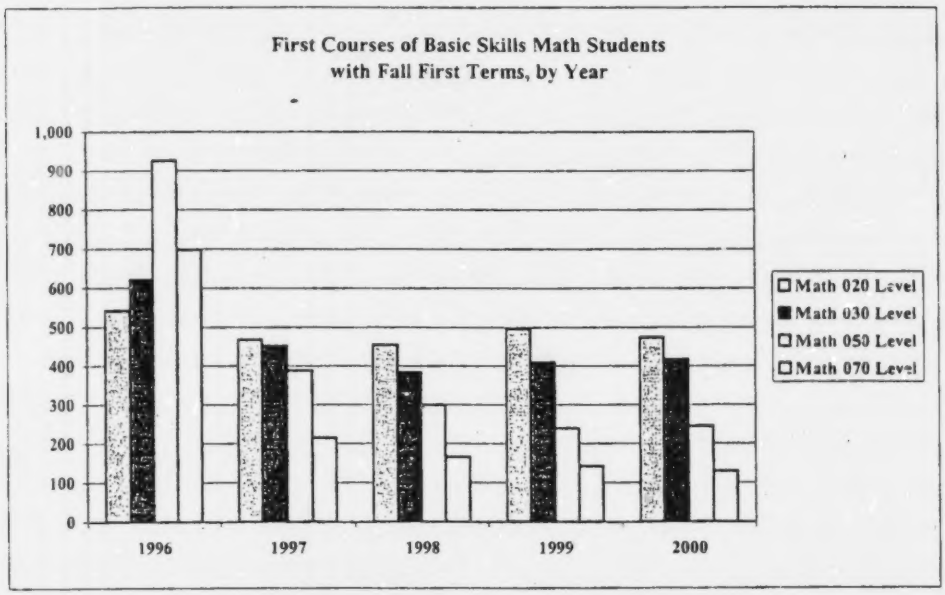
Otherwise the bigger enrollment demands are usually for MATH 050 level courses, followed by MATH 030 level courses. MATH 070 level courses attract about as many student enrollments as MATH 020, although in the earlier years of the five-year period MATH 070 level courses had attracted more Fall term enrollments than MATH 020 level courses did.

Enrollments in First Courses. By looking at enrollments in the first course for each student during the five-year period one can get a better idea of relative shifts in demand for courses at different levels. Early in the time period some of the students will be part way through a cycle of basic skills MATH courses, but by the later years one should be able to get a sense of actual starting course behavior of students. In Chart 2 one can see the distribution of first courses and changes in that distribution over time. The number of students taking Math/Science Center courses in their first term is, however, under-represented here, since the sorting procedure favored selection of a semester length Basic Skills Math course as the "first course," if taken, even when a Math/Science Center course might be taken in the same first term of enrollment during the five-year period. The issue of course taking of Math/Science Center courses with other Math courses is dealt with more fully later in this report. There are also a few known cases in which a student took Basic Skills Math courses at different levels in the same term, and in those cases the lower level Basic Skills Math course would be selected as the "first course" if it was the first term in the period that a student took a Math course at Rio Hondo College.

While Chart 1 concerns all 39,604 courses taken by students at any time in the five-year study period, Chart 2 concerns the first courses taken by the 15,743 individual students who took one or more courses during the study period. Fall, Spring, and Summer term "first enrollments" are shown on separate pages of Chart 2 since students starting MATH in different terms might behave differently. The impact of looking at "first courses" in an artificially delimited five-year time period shows up clearly in the Fall 1996 and Spring 1997 numbers. For an unknown number of students these "first courses" are really second, third, or fourth Basic Skills Math courses. They appear here as "first courses" because of the artificial time limitations, and artificially inflate the total number of students in the "first course" pool in Fall 1996 and Spring 1997.

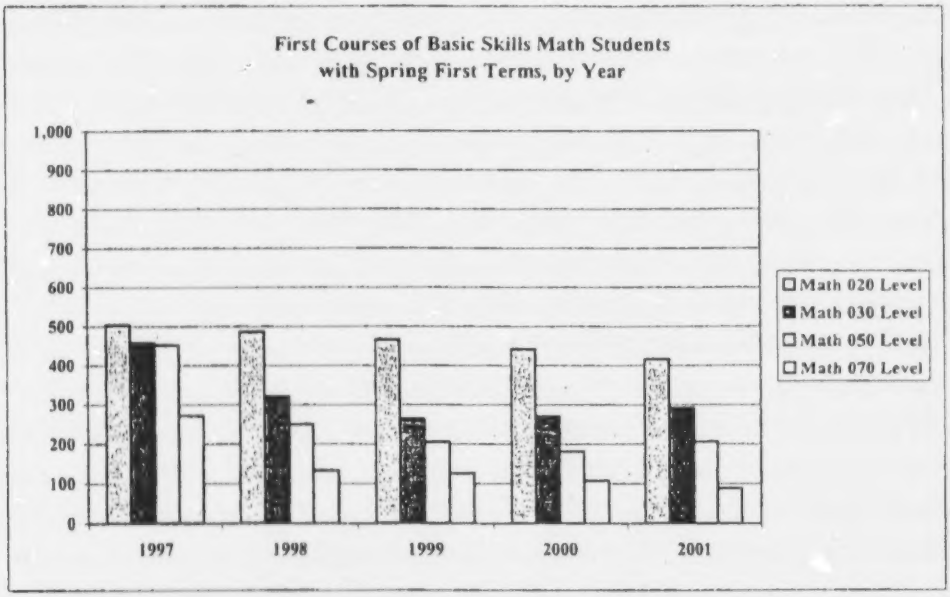
Concentrating on the later years, however, Chart 2 reveals several things. First, during the Fall and Spring terms very few people ever chose one of the Math/Science Center B, C, or D courses as the first ones they would attempt in this time period. Rather, student took first one of the semester length courses (or that plus a Math/Science Center course -- which would not appear because of the sort order) much more often than only a Math/Science Center A course. This tells the same story as the overall enrollment distribution did: the Math/Science Center courses were an alternative, not the main choice of most Basic Skills Math students.

CHART 2
BASIC SKILLS MATHEMATICS STUDENTS
BY COURSE LEVEL OF FIRST COURSES
FALL 1996 THROUGH SUMMER 2001



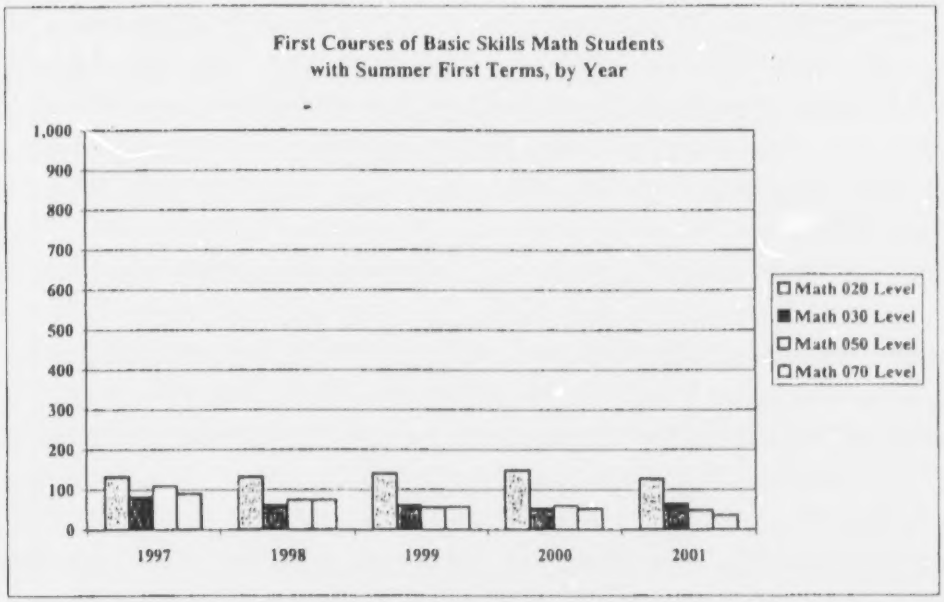
First Courses	Fall Terms						
Course Enrollments	1996	1997	1998	1999	2000	Total	Percents
Math 020 Level	542	468	455	497	474	2,436	29.8%
Math 020	373	346	348	393	384	1,844	22.6%
Math 020A	135	117	101	100	82	535	6.5%
Math 020B	28	4	2	3	2	39	0.5%
Math 020C	6	1	4	1	6	18	0.2%
Math 030 Level	621	452	384	410	417	2,284	28.0%
Math 030	621	364	327	346	352	2,010	24.6%
Math 030A		88	55	64	65	272	3.3%
Math 030B			2			2	0.0%
Math 030C						0	0.0%
Math 030D						0	0.0%
Math 050 Level	926	388	300	239	245	2,098	25.7%
Math 050	756	278	241	184	181	1,640	20.1%
Math 050A	107	107	52	51	63	380	4.7%
Math 050B	27	2	5	2	1	37	0.5%
Math 050C	25	1	2	1		29	0.4%
Math 050D	11			1		12	0.1%
Math 070 Level	698	215	166	142	130	1,351	16.5%
Math 070	698	165	138	114	98	1,213	14.8%
Math 070A		49	28	28	32	137	1.7%
Math 070B		1				1	0.0%
Math 070C						0	0.0%
Math 070D						0	0.0%
Total Enrollments	2,787	1,523	1,305	1,288	1,266	8,169	100.0%
Percentage by Year	34.1%	18.6%	16.0%	15.8%	15.5%	100.0%	

CHART 2
BASIC SKILLS MATHEMATICS STUDENTS
BY COURSE LEVEL OF FIRST COURSES
FALL 1996 THROUGH SUMMER 2001



First Courses	Spring Terms						
Course Enrollments	1997	1998	1999	2000	2001	Total	Percents
Math 020 Level	504	486	466	442	417	2,315	39.0%
Math 020	404	399	403	368	327	1,901	32.0%
Math 020A	81	80	62	73	84	380	6.4%
Math 020B	8	4	1		2	15	0.3%
Math 020C	11	3		1	4	19	0.3%
Math 030 Level	457	320	264	270	293	1,604	27.0%
Math 030	441	262	208	207	226	1,344	22.6%
Math 030A	16	58	55	63	67	259	4.4%
Math 030B			1			1	0.0%
Math 030C						0	0.0%
Math 030D						0	0.0%
Math 050 Level	451	249	205	181	206	1,292	21.8%
Math 050	371	192	164	134	169	1,030	17.4%
Math 050A	67	56	40	44	37	244	4.1%
Math 050B	6			1		7	0.1%
Math 050C	4					4	0.1%
Math 050D	3	1	1	2		7	0.1%
Math 070 Level	271	132	125	107	88	723	12.2%
Math 070	254	102	93	76	61	586	9.9%
Math 070A	17	30	32	30	27	136	2.3%
Math 070B						0	0.0%
Math 070C				1		1	0.0%
Math 070D						0	0.0%
Total Enrollments	1,683	1,187	1,060	1,000	1,004	5,934	100.0%
	28.4%	20.0%	17.9%	16.9%	16.9%	100.0%	

CHART 2
BASIC SKILLS MATHEMATICS STUDENTS
BY COURSE LEVEL OF FIRST COURSES
FALL 1996 THROUGH SUMMER 2001



First Courses	Summer Terms						
Course Enrollments	1997	1998	1999	2000	2001	Total	Percents
Math 020 Level	131	131	139	148	126	675	41.2%
Math 020	111	105	111	127	99	553	33.7%
Math 020A	19	22	26	18	25	110	6.7%
Math 020B	1	3	1	3	1	9	0.5%
Math 020C		1	1		1	3	0.2%
Math 030 Level	81	60	60	52	64	317	19.3%
Math 030	63	34	43	35	45	220	13.4%
Math 030A	16	26	17	17	18	94	5.7%
Math 030B	1				1	2	0.1%
Math 030C						0	0.0%
Math 030D	1					1	0.1%
Math 050 Level	108	74	55	59	47	343	20.9%
Math 050	74	35	34	31	27	201	12.3%
Math 050A	27	39	21	26	19	132	8.0%
Math 050B	2			2	1	5	0.3%
Math 050C	2					2	0.1%
Math 050D	3					3	0.2%
Math 070 Level	89	74	56	51	35	305	18.6%
Math 070	44	29	27	27	23	150	9.1%
Math 070A	42	45	29	24	12	152	9.3%
Math 070B	1					1	0.1%
Math 070C	2					2	0.1%
Math 070D						0	0.0%
Total Enrollments	409	339	310	310	272	1,640	100.0%
	24.9%	20.7%	18.9%	18.9%	16.6%	100.0%	

The Math/Science Center courses were, however, more attractive to Summer term students as their first courses. Judging by the relative numbers of Summer term students taking a Math/Science Center "A" course instead of the equivalent regular classroom course, the attractiveness of the computer courses apparently increases as the level of the course (and presumably the capability of the students) increases. In particular, in some years the number of summer students attempting MATH 70A approached or exceeded the number taking MATH 070. On the other hand, the number of summer students taking MATH 020A as their first course was generally one-fourth to one-fifth the number of summer students taking MATH 020 as their first course. The relative attractiveness of the Math/Science Center computer courses in the summer and at higher Basic Math skill levels may deserve further qualitative research to find out from the students why this is so.

Other trends visible in Chart 2 are decreases between Fall 1997 and Fall 1999 (and between Spring 1998 and Spring 2000) in the number of students taking MATH 050 as their first courses. Similarly, between Fall 1997 and Fall 2000 (and between Spring 1998 and Spring 2001) there was a decrease in the number of students taking MATH 070 as their first courses. It may be worth checking Math placement test results to see if these changes reflect a gradual change in abilities of incoming student cohorts, or something else (e.g., delays in taking first Math courses).

Course Success Rates. Chart 3 shows the overall Basic Skills Math courses grade distribution for all 39,604 enrollments. Based on Chancellor's Office definitions, "success" is defined as a grade of "A," "B," "C," or "CR" (after considering any grade changes), and anything else is considered "Not Success." Students do not succeed when they receive poor grades ("D," "F," "NC, plus "I"), or when they withdraw from a course ("W" grade). Based on student records, the overall success rate in all Basic Skills Math courses was about 43 percent in this time period, with success rates of 41 percent at the Math 020 level, 49 percent at the Math 030 level, 41 percent at the Math 050 level, and 42 percent at the Math 070 level.

These nominal success rates, however, are artificially low for two reasons. First, the methodology used in this analysis has not been adjusted to exclude situations in which a student withdraws from one section within a term and switches to another section of the same course. Since all course enrollments are counted, the number of withdrawals is somewhat higher as a result. (The methodology did exclude from any consideration those cases in which students withdrew from a course before the term even started, and also excluded duplicate entry situations, in which the student was in the computer twice for exactly the same section of the same course in the same term). More importantly, however, the nominal success rate may be artificially low because withdrawals from each of the Math/Science Center computer courses occurred at approximately twice the rate of withdrawals from the term length, traditional instruction courses. Except for MATH 030A, withdrawal rates for the computer module courses were consistently in the 60 percent to 76 percent range, while those in the term length courses fell in the 24 percent to 34 percent range.

Information from Basic Skills Math faculty indicates that the reason for the high computer course module withdrawal rates relates partially to administrative procedures that require a student to register in a course by a particular date if the student thinks he or she may want to attempt that course at any point in the term. The Math/Science Center courses are self-paced,

CHART 3
BASIC SKILLS MATHEMATICS ENROLLMENTS
FALL 1996 THROUGH SUMMER 2001
SUCCESS RATES BY COURSE

	Course Grades									Poor		Did Not				Poor	Graded
	A	B	C	CR	Succeeded	D	F	I	NC	Grades	Withdrew	Succeed	Totals	Succeeded	Grades	Totals *
Math 020 Level	980	1,273	1,155	13	3,421	349	1,230	2	1	1,582	3,291	4,873	8,294	3,421	1,582	5,003
	12%	15%	14%	0%	41%	4%	15%	0%	0%	19%	40%	59%	100%	68%	32%	100%
Math 020	693	923	1,082	12	2,710	333	884	1	1	1,219	1,560	2,779	5,489	2,710	1,219	3,929
	13%	17%	20%	0%	49%	6%	16%	0%	0%	22%	28%	51%	100%	69%	31%	100%
Math 020A	158	172	40	1	371	12	212	1		225	897	1,122	1,493	371	225	596
	11%	12%	3%	0%	25%	1%	14%	0%	0%	15%	60%	75%	100%	62%	38%	100%
Math 020B	73	94	22		189	2	89			91	454	545	734	189	91	280
	10%	13%	3%	0%	26%	0%	12%	0%	0%	12%	62%	74%	100%	68%	33%	100%
Math 020C	56	84	11		151	2	45			47	380	427	578	151	47	198
	10%	15%	2%	0%	26%	0%	8%	0%	0%	8%	66%	74%	100%	76%	24%	100%
Math 030 Level	1,327	2,017	1,467	35	4,846	527	965	3	22	1,517	3,506	5,023	9,869	4,846	1,517	6,363
	13%	20%	15%	0%	49%	5%	10%	0%	0%	15%	36%	51%	100%	76%	24%	100%
Math 030	917	1,425	1,391	29	3,762	490	748	3	21	1,262	1,620	2,882	6,644	3,762	1,262	5,024
	14%	21%	21%	0%	57%	7%	11%	0%	0%	19%	24%	43%	100%	75%	25%	100%
Math 030A	247	227	21	3	498	29	115		1	145	631	776	1,274	498	145	643
	19%	18%	2%	0%	39%	2%	9%	0%	0%	11%	50%	61%	100%	77%	23%	100%
Math 030B	90	154	17	1	262	4	64			68	520	588	850	262	68	330
	11%	18%	2%	0%	31%	0%	8%	0%	0%	8%	61%	69%	100%	79%	21%	100%
Math 030C	42	115	19		176	4	21			25	418	443	619	176	25	201
	7%	19%	3%	0%	28%	1%	3%	0%	0%	4%	68%	72%	100%	88%	12%	100%
Math 030D	31	96	19	2	148		17			17	317	334	482	148	17	165
	6%	20%	4%	0%	31%	0%	4%	0%	0%	4%	66%	69%	100%	90%	10%	100%
Math 050 Level	1,441	1,821	1,684	69	5,015	516	1,183	3	32	1,734	5,469	7,203	12,218	5,015	1,734	6,749
	12%	15%	14%	1%	41%	4%	10%	0%	0%	14%	45%	59%	100%	74%	26%	100%
Math 050	987	1,337	1,583	66	3,973	474	856	1	28	1,359	2,666	4,025	7,998	3,973	1,359	5,332
	12%	17%	20%	1%	50%	6%	11%	0%	0%	17%	33%	50%	100%	75%	25%	100%
Math 050A	257	205	52		514	37	179		1	217	1,102	1,319	1,833	514	217	731
	14%	11%	3%	0%	28%	2%	10%	0%	0%	12%	60%	72%	100%	70%	30%	100%
Math 050B	89	119	21	1	230	3	105	2	3	113	714	827	1,057	230	113	343
	8%	11%	2%	0%	22%	0%	10%	0%	0%	11%	68%	78%	100%	67%	33%	100%
Math 050C	66	81	10	1	158	1	28			29	586	615	773	158	29	187
	9%	10%	1%	0%	20%	0%	4%	0%	0%	4%	76%	80%	100%	84%	16%	100%
Math 050D	42	79	18	1	140	1	15			16	401	417	557	140	16	156
	8%	14%	3%	0%	25%	0%	3%	0%	0%	3%	72%	75%	100%	90%	10%	100%
Math 070 Level	1,104	1,404	1,276	88	3,872	444	789	0	49	1,282	4,069	5,351	9,223	3,872	1,282	5,154
	12%	15%	14%	1%	42%	5%	9%	0%	1%	14%	44%	58%	100%	75%	25%	100%
Math 070	852	1,071	1,211	87	3,221	434	649		48	1,131	2,260	3,391	6,612	3,221	1,131	4,352
	13%	16%	18%	1%	49%	7%	10%	0%	1%	17%	34%	51%	100%	74%	26%	100%
Math 070A	116	118	24		258	9	102			111	799	910	1,168	258	111	369
	10%	10%	2%	0%	22%	1%	9%	0%	0%	10%	68%	78%	100%	70%	30%	100%
Math 070B	55	83	20		158		27			27	400	427	585	158	27	185
	9%	14%	3%	0%	27%	0%	5%	0%	0%	5%	68%	73%	100%	85%	15%	100%
Math 070C	46	72	10		128		11			11	333	344	472	128	11	139
	10%	15%	2%	0%	27%	0%	2%	0%	0%	2%	71%	73%	100%	92%	8%	100%
Math 070D	35	60	11	1	107	1			1	2	277	279	386	107	2	109
	9%	16%	3%	0%	28%	0%	0%	0%	0%	1%	72%	72%	100%	98%	2%	100%
Total Enrollments	4,852	6,515	5,582	205	17,154	1,836	4,167	8	104	6,115	16,335	22,450	39,604	17,154	6,115	23,269
	12%	16%	14%	1%	43%	5%	11%	0%	0%	15%	41%	57%	100%	74%	26%	100%

* "Graded Totals" excludes students who withdrew from courses, but includes those who receive "CR," "NC," or "I" grades.

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and may be attempted at any time in the term, so students sign up for modules to reserve the right to attempt them, and then withdraw so as to avoid a poor grade on their transcripts if they don't have time to reach the module. The more difficult a Math/Science Center course module within a particular Basic Skills Math level, the greater the proportion of withdrawals. Since the percentage of withdrawals in the Math/Science Center course modules was so high, the MSC success rates were lower than those for the semester length traditional courses.

Following, this line of argument, the success rates in the term length courses MATH 020 (49 percent), MATH 030 (47 percent), MATH 050 (50 percent), and MATH 070 (49 percent) reflect more accurately the teaching and learning experiences at the different Basic Skills Math levels. These success rates are quite uniform. That suggests that effective teaching has been occurring across the curriculum, and that students may be learning at equivalent rates across the Basic Skills Math curriculum.

By excluding the withdrawals in both the term length courses and the Math/Science Center courses, one can gain a better comparison of the relative grade levels of those who are retained to the end of their courses. These results are shown in the last three columns on the right of Chart 3. Considering just those students who finish their courses and receive grades, success rates for all Basic Skills Math courses were 74 percent during this five-year period. Counted this way, success rates were 68 percent at the Math 020 level, 76 percent at the Math 030 level, 74 percent at the Math 050 level, and 75 percent at the Math 070 level.

Furthermore, looked at this way, students who attempted and stayed with the MSC MATH course modules to the end generally succeeded in the individual modules at or above the success rates of those who took the term length courses. In fact, the more advanced the level of the module at a particular course level, the greater was the success rate. Excluding "W" grades, MSC module graded success rates at the MATH 020 level ranged monotonically upward from 62 percent (MATH 020A) to 76 percent (MATH 020C); MSC module graded success rates at the MATH 030 level ranged monotonically upward from 77 percent (MATH 030A) to 90 percent (MATH 030D); MSC module graded success rates at the MATH 050 level fluctuated from 70 percent (MATH 050A) to 67 percent (MATH 050B) before rising monotonically upward to 90 percent (MATH 050D); and MSC module graded success rates at the MATH 070 level ranged monotonically upward from 70 percent (MATH 070A) to an astounding 98 percent (MATH 070D). Since lower proportions of students enrolled in the more difficult modules of Math/Science Center courses, and lower proportions stuck with them to the point of receiving a grade (other than "W"), some self-selection may be occurring. In addition, Math faculty indicate that students are held to somewhat higher quiz grade standards for successful completion of the Math/Science Center courses (of which the low proportion of "C" grades, as compared to "A" and "B" grades, is one indicator). Given that fact, only the better students may be liable to stick with the course to the end rather than drop with a "W" grade, or not succeed in the module because of too low a grade. Nevertheless, for the select group of students who take and complete the self-paced computer courses, the instructional method appears to be effective, as measured by grade results.

Student Success Rates at Different Basic Math Levels. Another way of looking at success rates is to consider the percentages of students who succeeded in passing each level of Basic Skills Mathematics. Passing a level can be achieved in one of two ways: a) pass the semester or term length course at that level (MATH 020, 030, 050, or 070); or b) pass all three or all four of the equivalent Math/Science Center computer modules at that level. Chart 4 indicates success rates at each level of students who enrolled in one or more courses at that level, as well as how they took courses at that level.

Of the 5,579 individual students who enrolled at some point during the five-year research period at the MATH 020 level, 50.3 percent eventually succeeded at that level. The 76 percent at this level who took only MATH 020 had a 59 percent success rate. The 7 percent who took MATH 020 plus one or more courses among MATH 020A, 020B, or 020C had a 45 percent success rate at the level, and the 17 percent who took only the Math/Science Center courses had only an 11 percent success rate at the level.

Of the 6,249 individual students who enrolled at some point during the five-year research period at the MATH 030 level, 61.6 percent eventually succeeded at that level. The 82 percent at this level who took only MATH 030 had a 68 percent success rate. The 7 percent who took MATH 030 plus one or more courses among MATH 030A, 030B, 030C, or 030D had a 51 percent success rate, and the 11 percent who took only the Math/Science Center courses had only a 16 percent success rate at the level.

Of the 6,832 individual students who enrolled at some point during the five-year research period at the MATH 050 level, 59.1 percent eventually succeeded at that level. The 78 percent at this level who took only MATH 050 had a 67 percent success rate. The 11 percent who took MATH 050 plus one or more courses among MATH 050A, 050B, 050C, or 050D had a 53 percent success rate, and the 11 percent who took only the Math/Science Center courses had only a 12 percent success rate at the level.

Of the 5,155 students who enrolled at some point during the five-year research period at the MATH 070 level, 63.3 percent eventually succeeded at that level. The 82 percent at this level who took only MATH 070 had a 70 percent success rate. The 9.5 percent who took MATH 070 plus one or more courses among MATH 070A, 070B, 070C, or 070D had a 47 percent success rate, and the 8 percent who took only the Math/Science Center courses had only a 20 percent success rate at the level.

At every level, then, students who took just the term length MATH course for the level had success rates that were 11 to 14 percentage points higher than those who took a combination of the term length MATH course and one or more of the Math/Science Center self-guided computer courses. The correlations of success with how students took courses at each level were always statistically significant and moderately strong (at the MATH 020 level, Pearson chi-square = 727.796, $p < .001$, Cramer's V = .361, $p < .001$; at the MATH 030 level, Pearson chi-square = 696.985, $p < .001$, Cramer's V = .334, $p < .001$; at the MATH 050 level, Pearson chi-square = 834.194, $p < .001$, Cramer's V = .349, $p < .001$; at the MATH 070 level, Pearson chi-square = 474.564, $p < .001$, Cramer's V = .309, $p < .001$). Clearly the semester (or summer term) length courses are most likely to result in success for students than either the

CHART 4
BASIC SKILLS MATHEMATICS STUDENTS
FALL 1996 THROUGH SUMMER 2001
TIME TO COURSE SUCCESS AND PERCENT SUCCEEDING

		ALL STUDENTS AT MATH 020 LEVEL						TOOK MATH 020 ONLY						TOOK MATH 010 AND SOME OR ALL OF MATH 020 A to C						TOOK SOME OR ALL OF MATH 020 A to C ONLY					
		Total		Succeeded		Did Not Succeed		Total		Succeeded		Did Not Succeed		Total		Succeeded		Did Not Succeed		Total		Succeeded A to C		Did Not Succeed	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Group Size		5,579	100%	2,804	50.3%	2,775	49.7%	4,248	100%	2,523	59%	1,725	41%	403	100%	182	45%	221	55%	928	100%	99	11%	829	89%
Average Terms at Level		1.15	100.0%	1.20		1.11		1.16	76.1%	1.13		1.21		2.12	7.2%	2.11		2.12		0.69	16.6%	1.20		0.62	
Distribution of Terms *		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group							
	0.33	455	8%			455	16%													455	49%			455	55%
	0.67	152	3%			152	5%													152	16%			152	18%
	1.00	3,902	70%	2,317	83%	1,585	57%	3,678	87%	2,246	89%	1,432	83%							224	24%	71	72%	153	18%
	1.33	201	4%	86	3%	115	4%							148	37%	71	39%	77	35%	53	6%	15	15%	38	5%
	1.67	65	1%	22	1%	43	2%							47	12%	20	11%	27	12%	18	2%	2	2%	16	2%
	2.00	552	10%	265	9%	287	10%	476	11%	235	9%	241	14%	60	15%	24	13%	36	16%	16	2%	6	6%	10	1%
	2.33	54	1%	28	1%	26	1%							50	12%	25	14%	25	11%	4	0%	3	3%	1	0%
	2.67	24	0%	8	0%	16	1%							20	5%	6	3%	14	6%	4	0%	2	2%	2	0%
	3.00	103	2%	44	2%	59	2%	77	2%	33	1%	44	3%	26	6%	11	6%	15	7%						0%
	3.33	23	0%	11	0%	12	0%							22	5%	11	6%	11	5%	1	0%			1	0%
	3.67	6	0%	2	0%	4	0%							5	1%	2	1%	3	1%	1	0%			1	0%
	4.00	19	0%	12	0%	7	0%	11	0%	8	0%	3	0%	8	2%	4	2%	4	2%						
	4.33	7	0%	4	0%	3	0%							7	2%	4	2%	3	1%						
	4.67	3	0%			3	0%							3	1%			3	1%						
	5.00	9	0%	2	0%	7	0%	6	0%	1	0%	5	0%	3	1%	1	1%	2	1%						
	5.67	1	0%	1	0%									1	0%	1	1%								
	6.33	1	0%	1	0%									1	0%	1	1%								
	6.67	1	0%			1	0%							1	0%			1	0%						
	7.00	1	0%	1	0%									1	0%	1	1%								
Group Total		5,579	100%	2,804	100%	2,775	100%	4,248	100%	2,523	100%	1,725	100%	403	100%	182	100%	221	100%	928	100%	99	100%	829	100%

		ALL STUDENTS AT MATH 030 LEVEL						TOOK MATH 030 ONLY						TOOK MATH 010 AND SOME OR ALL OF MATH 030 A to D						TOOK SOME OR ALL OF MATH 030 A to D ONLY					
		Total		Succeeded		Did Not Succeed		Total		Succeeded		Did Not Succeed		Total		Succeeded		Did Not Succeed		Total		Succeeded A to C		Did Not Succeed	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Group Size		6,249	100%	3,849	61.6%	2,400	38.4%	5,135	100%	3,512	68%	1,623	32%	446	100%	227	51%	219	49%	668	100%	110	16%	558	84%
Average Terms at Level		1.19	100.0%	1.19		1.19		1.17	82.2%	1.13		1.24		2.20	7.1%	2.20		2.21		0.72	10.7%	1.18		0.63	
Distribution of Terms *		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group							
	0.25	233	4%			233	10%													233	35%			233	42%
	0.50	103	2%			103	4%													103	15%			103	18%
	0.75	82	1%			82	3%													82	12%			82	15%
	1.00	4,575	73%	3,188	83%	1,387	58%	4,424	86%	3,121	89%	1,303	80%							151	23%	67	61%	84	15%
	1.25	146	2%	79	2%	67	3%							105	24%	52	23%	53	24%	41	6%	27	25%	14	3%
	1.50	70	1%	33	1%	37	2%							50	11%	25	11%	25	11%	20	3%	8	7%	12	2%
	1.75	50	1%	18	0%	32	1%							37	8%	16	7%	21	10%	13	2%	2	2%	11	2%
	2.00	670	11%	365	9%	305	13%	600	12%	333	9%	267	16%	57	13%	28	12%	29	13%	13	2%	4	4%	9	2%
	2.25	64	1%	33	1%	31	1%							59	13%	33	15%	26	12%	5	1%			5	1%
	2.50	27	0%	16	0%	11	0%							23	5%	14	6%	9	4%	4	1%	2	2%	2	0%
	2.75	21	0%	8	0%	13	1%							19	4%	8	4%	11	5%	2	0%		0%	2	0%
	3.00	124	2%	72	2%	52	2%	89	2%	52	1%	37	2%	35	8%	20	9%	15	7%						
	3.25	20	0%	10	0%	10	0%							19	4%	10	4%	9	4%	1	0%			1	0%
	3.50	6	0%	4	0%	2	0%							6	1%	4	2%	2	1%						
	3.75	7	0%	3	0%	4	0%							7	2%	3	1%	4	2%						
	4.00	22	0%	7	0%	15	1%	16	0%	4	0%	12	1%	6	1%	3	1%	3	1%						
	4.25	8	0%	5	0%	3	0%							8	2%	5	2%	3	1%						
	4.50	4	0%			4	0%							4	1%			4	2%						
	4.75	3	0%	2	0%	1	0%							3	1%	2	1%	1	0%						
	5.00	7	0%	3	0%	4	0%	6	0%	2	0%	4	0%	1	0%	1	0%								
	5.25	2	0%	2	0%									2	0%	2	1%								
	5.75	2	0%	1	0%	1	0%							2	0%	1	0%	1	0%						
	6.75	1	0%			1	0%							1	0%			1	0%						
	7.75	1	0%			1	0%							1	0%			1	0%						
	9.75	1	0%			1	0%							1	0%			1	0%						
Group Total		6,249	100%	3,849	100%	2,400	100%	5,135	100%	3,512	100%	1,623	100%	446	100%	227	100%	219	100%	668	100%	110	100%	558	100%

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CHART 4
BASIC SKILLS MATHEMATICS STUDENTS
FALL 1996 THROUGH SUMMER 2001
TIME TO COURSE SUCCESS AND PERCENT SUCCEEDING

	ALL STUDENTS AT MATH 050 LEVEL						TOOK MATH 050 ONLY						TOOK MATH 050 AND SOME OR ALL OF MATH 050 A to D						TOOK SOME OR ALL OF MATH 050 A to D ONLY					
	Total		Succeeded		Did Not Succeed		Total		Succeeded		Did Not Succeed		Total		Succeeded		Did Not Succeed		Total		Succeeded A to C		Did Not Succeed	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Group Size	6,832	100%	4,036	59.1%	2,796	40.9%	5,303	100%	3,537	67%	1,766	33%	771	100%	408	53%	363	47%	758	100%	91	12%	667	88%
Average Terms at Level	1.33	100.0%	1.34		1.30		1.27	77.6%	1.23		1.34		2.34	11.3%	2.30		2.38		0.69	11.1%	1.24		0.61	
Distribution of Terms *	N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group							
0.25	292	4%			292	10%													292	39%			292	44%
0.50	130	2%			130	5%													130	17%			130	19%
0.75	97	1%			97	3%													97	13%			97	15%
1.00	4,349	64%	2,946	73%	1,403	50%	4,217	80%	2,892	82%	1,325	75%							132	18%	54	59%	78	12%
1.25	265	4%	137	3%	128	5%							214	28%	117	29%	97	27%	51	7%	20	22%	31	5%
1.50	89	1%	44	1%	45	2%							67	9%	38	9%	31	9%	22	3%	8	9%	14	2%
1.75	59	1%	29	1%	30	1%							49	6%	28	7%	21	6%	10	1%	1	1%	9	1%
2.00	908	13%	550	14%	358	13%	831	16%	507	14%	324	18%	67	9%	41	10%	26	7%	10	1%	2	2%	8	1%
2.25	96	1%	51	1%	45	2%							93	12%	48	12%	45	12%	3	0%	3	3%		
2.50	48	1%	20	0%	28	1%							45	6%	20	5%	25	7%	3	0%			3	0%
2.75	29	0%	15	0%	14	1%							28	4%	15	4%	13	4%	1	0%			1	0%
3.00	247	4%	139	3%	108	4%	191	4%	110	3%	81	5%	53	7%	27	7%	26	7%	3	0%	2	2%	1	0%
3.25	40	1%	14	0%	26	1%							38	5%	13	3%	25	7%	2	0%	1	1%	1	0%
3.50	27	0%	14	0%	13	0%							27	4%	14	3%	13	4%						
3.75	10	0%	6	0%	4	0%							10	1%	6	1%	4	1%						
4.00	59	1%	29	1%	30	1%	50	1%	23	1%	27	2%	9	1%	6	1%	3	1%						
4.25	19	0%	13	0%	6	0%							18	2%	13	3%	5	1%	1	0%			1	0%
4.50	9	0%	5	0%	4	0%							9	1%	5	1%	4	1%						
4.75	4	0%	2	0%	2	0%							4	1%	2	0%	2	1%						
5.00	21	0%	7	0%	14	1%	8	0%	2	0%	6	0%	13	2%	5	1%	8	2%						
5.25	7	0%	5	0%	2	0%							7	1%	5	1%	2	1%						
5.50	6	0%			6	0%							5	1%			5	1%	1	0%			1	0%
5.75	3	0%	1	0%	2	0%							3	0%	1	0%	2	1%						
6.00	6	0%	3	0%	3	0%	4	0%	2	0%	2	0%	2	0%	1	0%	1	0%						
6.25	2	0%			2	0%							2	0%			2	1%						
6.50	2	0%	1	0%	1	0%							2	0%	1	0%	1	0%						
6.75	1	0%			1	0%							1	0%			1	0%						
7.25	2	0%	1	0%	1	0%							2	0%	1	0%	1	0%						
7.50	2	0%	2	0%									2	0%	2	0%								
8.00	2	0%	1	0%	1	0%	2	0%	1	0%	1	0%												
8.50	1	0%	1	0%									1	0%	1	0%								
Group Total	6,832	100%	4,036	100%	2,796	100%	5,303	100%	3,537	100%	1,766	100%	771	100%	408	100%	363	100%	758	100%	91	100%	667	100%

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CHART 4
BASIC SKILLS MATHEMATICS STUDENTS
FALL 1996 THROUGH SUMMER 2001
TIME TO COURSE SUCCESS AND PERCENT SUCCEEDING

	ALL STUDENTS AT MATH 070 LEVEL						TOOK MATH 070 ONLY						TOOK MATH 070 AND SOME OR ALL OF MATH 070 A to D						TOOK SOME OR ALL OF MATH 070 A to D ONLY					
	Total		Succeeded		Did Not Succeed		Total		Succeeded		Did Not Succeed		Total		Succeeded		Did Not Succeed		Total		Succeeded A to C		Did Not Succeed	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Group Size	5,155	100%	3,265	63.3%	1,890	36.7%	4,237	100%	2,949	70%	1,288	30%	488	100%	230	47%	258	53%	430	100%	86	20%	344	80%
Average Terms at Level	1.41	100.0%	1.37		1.49		1.35	82.2%	1.29		1.48		2.55	9.5%	2.48		2.61		0.73	8.3%	1.06		0.65	
Distribution of Terms *	N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group		N & % of Group							
0.25	160	3%			160	8%													160	37%			160	47%
0.50	46	1%			46	2%													46	11%			46	13%
0.75	40	1%			40	2%													40	9%			40	12%
1.00	3,297	64%	2,385	73%	912	48%	3,172	75%	2,315	79%	857	67%							125	29%	70	81%	55	16%
1.25	145	3%	69	2%	76	4%							117	24%	57	25%	60	23%	28	7%	12	14%	16	5%
1.50	43	1%	16	0%	27	1%							31	6%	14	6%	17	7%	12	3%	2	2%	10	3%
1.75	23	0%	10	0%	13	1%							17	3%	8	3%	9	3%	6	1%	2	2%	4	1%
2.00	827	16%	504	15%	323	17%	777	18%	476	16%	301	23%	46	9%	28	12%	18	7%	4	1%			4	1%
2.25	73	1%	31	1%	42	2%							70	14%	31	13%	39	15%	3	1%			3	1%
2.50	24	0%	9	0%	15	1%							22	5%	9	4%	13	5%	2	0%			2	1%
2.75	21	0%	9	0%	12	1%							19	4%	9	4%	10	4%	2	0%			2	1%
3.00	245	5%	138	4%	107	6%	214	5%	121	4%	93	7%	31	6%	17	7%	14	5%						
3.25	38	1%	17	1%	21	1%							38	8%	17	7%	21	8%						
3.50	14	0%	6	0%	8	0%							13	3%	6	3%	7	3%	1	0%			1	0%
3.75	12	0%	4	0%	8	0%							12	2%	4	2%	8	3%						
4.00	65	1%	29	1%	36	2%	46	1%	23	1%	23	2%	18	4%	6	3%	12	5%	1	0%			1	0%
4.25	9	0%	5	0%	4	0%							9	2%	5	2%	4	2%						
4.50	7	0%	3	0%	4	0%							7	1%	3	1%	4	2%						
4.75	5	0%	2	0%	3	0%							5	1%	2	1%	3	1%						
5.00	25	0%	16	0%	9	0%	17	0%	11	0%	6	0%	8	2%	5	2%	3	1%						
5.25	10	0%	2	0%	8	0%							10	2%	2	1%	8	3%						
5.50	2	0%	1	0%	1	0%							2	0%	1	0%	1	0%						
5.75	1	0%	1	0%									1	0%	1	0%								
6.00	9	0%	3	0%	6	0%	8	0%	3	0%	5	0%	1	0%			1	0%						
6.25	4	0%	1	0%	3	0%							4	1%	1	0%	3	1%						
7.00	7	0%	3	0%	4	0%	3	0%			3	0%	4	1%	3	1%	1	0%						
7.25	2	0%	1	0%	1	0%							2	0%	1	0%	1	0%						
10.00	1	0%			1	0%							1	0%			1	0%						
Group Total	5,155	100%	3,265	100%	1,890	100%	4,237	100%	2,949	100%	1,288	100%	488	100%	230	100%	258	100%	430	100%	86	100%	344	100%

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combination of term courses and Math/Science Center modules, or attempting to pass the level by taking only Math/Science Center modules.

Time Spent in Basic Skill Math Courses – Methodology for Counting. One of the key concerns of the Basic Skills Math faculty is the amount of time students take to succeed in Basic Skills Math courses. It is easier to state the issue than to provide an answer, partly because counting "time" turns out to be methodologically challenging, for reasons explained here. There is an additional issue – the assumption that students do eventually succeed in one (or more) Basic Skills Math course – and that will also be considered later in this report.

For term length courses, the analysis below counts based on the number of terms (Fall, Spring, or Summer) in which students registered in term-length courses. For term length courses, the count of terms may differ from the count of enrollments for the same student, if only because of the withdraw-to-change-sections phenomenon mentioned above. There is, however, another counting problem that makes "enrollment" counts not equivalent to "term" counts. Enrollment in multiple Math/Science Center course modules can occur simultaneously within the same term. As noted above, students often enroll in multiple Math/Science Center course modules and then withdraw from some of them. Students may also enroll simultaneously in a semester long (or Summer term) Basic Skills Math course, and in one or more Math/Science Center course module at the same level, or at a lower level (for review?).

There is also a "time confound" and a "starting level" confound at work when counting terms to success (or terms of effort). The study period covers a total of five years, or 15 terms (including Summer terms), but students took their first Basic Skills Math course at different points in this time period (see Chart 2), and had a different number of potential terms left before the end of the research period in which they might have taken attempted Basic Skills Math courses. Note that students also could have enrolled in Basic Skills Math courses before the research period started, or may enroll in them after it ends. Students also took their first courses in the study period at different levels of Basic Skills Math (see Chart 3), so would need different minimum numbers of courses to complete the sequence of Basic Skills Math appropriate for their educational goals (through MATH 050 if they are seeking an AA or AS degree, or at least through or beyond MATH 070 if they want to transfer without having to potentially continue Basic Skills Math instruction at a four-year university). Finally, some students simply never moved beyond a particular level of Basic Skills Math, for a variety of reasons (e.g., poor grades in the first course, withdrawal from college, change of plans, discouragement, etc.). In the entire dataset, then, one finds students enrolled in Basic Skills Math courses (including the Math/Science Center courses) between 1 and 48 times, over 1 to 15 academic terms, within the period covered by the research.

There are, then, both methodological and logical problems in measuring "time to success" in Basic Skill Math courses (and over the sequence of courses). This analysis addresses the problems in the following ways.

First, for term length courses, the analysis counts the number of terms in which a student has enrolled, including summer terms, rather than the number of enrollments. So, if a student enrolls in a term-length course, withdraws, and then enrolls in another section of the same course in the same term, that is counted as "one" term. If the student enrolls in a term-length

course, withdraws, and then attempts the course again in a later term (or attempts no more MATH at all), the original enrollment is still counted as one term attempt – just as if the student had been retained to the end of the course and received a poor grade.

Second, since each Math/Science Center course module is designed to cover a portion of the content in the equivalent Basic Skills Math course, although in a variable amount of student self-paced time, those who take Math/Science Center course modules are presumably prepared to put in learning effort. In order to have some kind of an equivalency with the term-length course, a weighting scheme was used, so that each enrollment in MATH 020A, 020B, or 020C is counted as one-third of a term, and each enrollment in any of the other Math/Science Center Basic Skills Math modules is counted as one-quarter of a term. Since there is no question here of dropping a Math/Science Center course module in order to enroll in a different section with a different instructor, each withdrawal from the Math/Science Center course module is considered as equivalent to the case of the student who withdrew from the term-length Math course and didn't sign up for another one that term. The MSC course modules counted at a lower weight, however, since each module covers only a portion of the content of the equivalent term-length MATH course.

Using this approach, then, one can count "terms" in a comparable, additive, fashion across courses, and in such a way that if a student has signed up for both a term-length course and a Math/Science Center course module in the same term, that student will be considered to have undertaken a "term" effort of more than 1.0. Note that there were in the dataset a few demonstrable cases in which a student has somehow enrolled in two different Basic Skills MATH courses in the same term, but at different Basic Skills Math levels. In these few instances the student was counted as having one term of effort for each course, since the courses have different names. This is equivalent to counting each Basic Skills Math module with a different course name as taking a portion of a term.

This methodology will assign a "time penalty" for those students who do sign up for MSC multiple modules in the same term, and then drop them (perhaps without even attempting one lesson), but there is also a (greater) "time penalty" for students who sign up for a term-length course and then drop it after perhaps attending only a few lessons (or even none at all). Since there is no way to capture "actual effort" of students in class, this methodology at least attempts to "level the playing field" for counting "time" in equivalent ideal course "terms," and allows one to account equitably for common simultaneous course-taking patterns.

"Time Spent" in Basic Skills Math Courses. With the methodological approach in mind, how long during the study period did it take students, on average to succeed in Basic Skills Math Courses? The results are summarized in Chart 4. Students who succeeded at each level took, on average, 1.20 weighted terms to succeed at MATH 020 level, 1.19 weighted terms to succeed at MATH 030 level, 1.34 weighted terms to succeed at MATH 050 level, and 1.37 weighted terms to succeed at MATH 070 level. On average, then, students who succeeded in moving from MATH 020 through MATH 070 might need 5.1 terms to successfully complete a minimum of four courses (or 15 modules, or some combination of four courses and 15 modules).

Those who did not succeed averaged the same number or fewer weighted terms per level, except at the highest Basic Skills Math level: 1.11 weighted terms at MATH 020 level, 1.19 weighted terms at MATH 030 level, 1.30 weighted terms at MATH 050 level, and 1.49 weighted terms at the MATH 070 level. Only at the highest Basic Skills Math level did students who did not succeed at the level try more often, on average, than those who did succeed at that level.

Since each Math/Science course enrollment is weighted as 0.25 or 0.33 terms, depending on the level, it is only logical that those who took one (or more) regular semester/term length courses at a level plus one or more Math/Science courses at that level averaged more weighted terms at the level than those who only took the semester/term length course. The disparity in nominal time spent at the level is exacerbated by the high withdrawal rates in the Math/Science Center courses. Those who took only the semester/term length course and eventually succeeded in it averaged 1.13 terms in MATH 020, 1.13 terms in MATH 030, 1.23 terms in MATH 050, and 1.29 terms in MATH 070. On the other hand, those who took a combination of the term length course and one or more Math/Science Center courses averaged 2.11 weighted terms to succeed at the MATH 020 level, 2.20 weighted terms to succeed at the MATH 030 level, 2.30 weighted terms to succeed at the MATH 050 level, and 2.48 weighted terms to succeed at the MATH 070 level.

The higher the level at which students were attempting Basic Skills Math, the greater the difference between the average number of terms attempted by those who did not succeed at that level, compared to those who did succeed at that level. Those who did not succeed were trying more often, on average, than those who did succeed. This was true whether the students were only trying the term length course at a level, or trying a combination of the term length course and one or more MSC modules. This is a logical statement rather than a statistically significant one (statistical significance has not been tested). A comparison of weighted terms to "success" to weighted terms to "no success" at each level is shown in Chart 4 and on the next page.

The statement in the last paragraph appears to contradict the one in the second paragraph in this section. The explanation comes from looking at the characteristics of the students who ONLY took Math/Science Center course modules at a level. As shown in Chart 4 and on the next page, students who took only Math/Science Center courses averaged fewer weighted terms overall at that level. Large proportions (80 to 89 percent) did not succeed at the level, and 72 to 78 percent of the MSC only students attempted too few MSC course modules to pass at the level (i.e., they took two or fewer modules at the 020 level, and three or fewer at the 030, 050, or 070 levels).

Note also that for those few students who were successful at a level while taking only MSC courses, their average weighted time to success was about the same as that of those who took the semester/term length course: 1.20 weighted terms compared to 1.13 terms at the MATH 020 level; 1.18 weighted terms compared to 1.13 terms at the MATH 030 level; 1.24 weighted terms compared to 1.23 terms at the MATH 050 level; and 1.06 weighted terms compared to 1.29 terms at the MATH 070 level. Of course individual students take the MSC courses at their own rate, so might have actually completed more quickly in actual time than those taking the equivalent semester or term length course.

Course Level	Succeeded – only took semester or term course at level	Did Not Succeed – only took semester or term course at level	Succeeded – took semester or term course and one or more MSC modules at level	Did Not Succeed -- took semester or term course and one or more MSC modules at level
MATH 020 Level	Average 1.13 terms	Average 1.21 terms	Average 2.11 weighted terms	Average 2.12 weighted terms
MATH 030 Level	Average 1.13 terms	Average 1.24 terms	Average 2.20 weighted terms	Average 2.21 weighted terms
MATH 050 Level	Average 1.23 terms	Average 1.34 terms	Average 2.30 weighted terms	Average 2.38 weighted terms
MATH 070 Level	Average 1.29 terms	Average 1.48 terms	Average 2.48 weighted terms	Average 2.61 weighted terms

Level	Overall Number Attempting ONLY MSC Modules at level	Average weighted terms of MSC module attempts at level	Number & Percent Succeeding at level	Average weighted terms to Success at level – only took MSC courses	Number & Percent Not Succeeding at level	Average weighted terms in attempts at level
MATH 020 Level	928	0.69	99 (11 %)	1.20	829 (89 %)	0.62
MATH 030 Level	668	0.72	110 (16 %)	1.18	558 (84 %)	0.63
MATH 050 Level	758	0.69	91 (12 %)	1.24	667 (88 %)	0.61
MATH 070 Level	430	0.73	86 (20 %)	1.06	344 (80 %)	0.65

Measured under the weighting methodology of this study, only at the highest, MATH 070 level, is there a possible nominal time to success advantage for taking just MSC courses. Self-

selection of students attempting the MSC courses again cannot be ruled out. Otherwise, the existence of the MSC courses lowers the weighted time in course because of those who attempt only MSC courses and do not succeed at the level because they withdraw from their courses in greater proportions, or do not attempt enough such courses to complete the module sequence at that level.

Success Across the Sequence of Basic Skills Math Courses. Finally, we turn to the question of what proportion of students succeeded at one Basic Skills Math level, and then succeeded at subsequent Basic Skills Math levels? This question begs another question – what proportions of students succeeded at one Basic Skills Math level and then attempted the next level at Rio Hondo College?

During the five-year research period, 5,579 students took courses at the MATH 020 level (i.e., MATH 020 or MATH 020A, B, or C). Of those students, 50.3 percent succeeded at that level. Of the original 5,579 students, 2,068 or 37 percent attempted courses at the MATH 030 level (i.e., MATH 030 or MATH 030 A, B, C, or D) and 63.7 percent of those who attempted that level, succeeded at it. While about 68 percent of those who had succeeded at the 020 level continued on to the 030 level, only about 6 percent of those who had not succeeded at the lower level attempted Rio Hondo courses at the 030 level.

While 2,068 of the original 5,579 MATH 020 level students had attempted MATH 030 level courses, only 1,109 attempted MATH 050 level courses during the research period. That amounts to about 20 percent of the original group of students who had attempted MATH 020. The overall success rate of students who had taken MATH 020 and MATH 050 at Rio Hondo during the research period was 55.1 percent.

About 93 percent of those attempting MATH 050 had previously attempted both MATH 020 and MATH 030 level courses, and 85 percent had succeeded at both prior levels. This subgroup that had succeeded at both prior levels had a 57.8 percent success rate at the MATH 050 level (i.e., 545 successful students out of 943 continuing students).

However, about 15 percent of those who were attempting MATH 050 level courses at Rio Hondo, had arrived at the MATH 050 level through routes not expected by the usual sequence (i.e., MATH 020 level – MATH 030 level – MATH 050 level, with all courses taken at Rio Hondo and success at prior levels). This can be shown in the chart on the following page. All had taken MATH 020 at Rio Hondo, but some had not succeeded at the MATH 020 level here, and others had either not attempted or not succeeded at Rio Hondo at the MATH 030 level. Students who followed unusual paths to MATH 050 had somewhat lower success rates, reducing the overall success rate in MATH 050 to the 55.1 percent figure mentioned above.

When looking at MATH 070 success, one finds that only 382 (6.8 percent) of the 5,579 students who had attempted MATH 020 level at Rio Hondo, attempted MATH 070 level courses here during the research period. Of those 382, fully 315 (82.5 %) had passed each of the MATH 020, 030, and 050 levels at Rio Hondo College. The success rate at the MATH 070 level of the 382 was 62.0 percent. The success rate at the MATH 070 level of the 315 who had previously passed all prior MATH levels at Rio Hondo College was 63.8 percent.

MATH 020 Level Situation N = 5,579	MATH 030 Level Situation	MATH 030 Level Attempts N = 2,068	MATH 050 Level Situation	MATH 050 Level Attempts N = 1,109
			Total MATH 050 Level Students = 1,109 (19.9 % of MATH 020)	Total Success at MATH 050 Level = 611 (55.1 % success rate at level)
	Total MATH 030 Level Students = 2,068 (37.1 % of MATH 020 students)	Total Success at MATH 030 Level = 1,317 (63.7 % success rate at MATH 030 Level)		
Succeeded at MATH 020 Level = 2,804 (50.3 % success rate at MATH 020 level)	Attempted MATH 030 Level = 1,894 (67.5 % of MATH 020 successes)	Succeeded at MATH 030 Level = 1,256 (66.3 % success rate at MATH 030 level)	Attempted MATH 050 Level = 974 (includes 943 Successes at 030 and 31 Non-successes)	Succeeded at MATH 050 Level = 550 (56.5 % success rate) – 545 had MATH 030 level successes
	Did Not Attempt MATH 030 Level = 910 (32.5 % of MATH 020 successes)		Attempted MATH 050 Level = 30	Succeeded at MATH 050 Level = 15 (50.0 % success rate for group)
Did Not Succeed at MATH 020 Level = 2,775 (49.7 % non-successes	Attempted MATH 030 Level = 174 (6.3 % of MATH 020 Level Non-successes)	Succeeded at MATH 030 Level = 61 (35.1 % success rate at MATH 030 level)	Attempted MATH 050 Level = 62 (includes 49 Successes at 030 Level and 13 Non-successes)	Succeeded at MATH 050 Level = 30 (48.4 % success rate) – 29 had MATH 030 level successes
	Did Not Attempt MATH 030 Level = 2,601 (93.7 %)		Attempted MATH 050 Level = 43	Succeeded at MATH 050 Level = 16 (37.2 %)

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A similar story can be seen when examining those who did take MATH 030 level courses (but not MATH 020 level courses) at Rio Hondo College during the research period. There were 4,181 such students and 60.6 percent succeeded at the MATH 030 level. About 49 percent or 2,043 of the original group also took MATH 050 level courses at Rio Hondo during the study period. Those 2,043 had a 62.5 percent success rate at the MATH 050 level. The MATH 050 level success rate was slightly higher, 63.9 percent, among the 1,954 who had already succeeded at the MATH 030 level.

Of the original 4,181 MATH 030 level students, 876 (21 %) attempted MATH 070 level courses at Rio Hondo during the study period. Fully 826 or 94 percent of those 876 MATH 070 level students had already succeeded at both MATH 030 and MATH 050 levels at Rio Hondo. The other 50 had followed different patterns before arriving at the top Basic Skills Mathematics level. The overall success rate for all 876 MATH 070 level students was 68.3 percent. The success rate for the 826 students who had previously succeeded at the MATH 030 and 050 levels at Rio Hondo was slightly higher, 69.5 percent.

Finally, there were 3,680 students that did not take MATH 020 or MATH 030 level courses at Rio Hondo during the study period, but did take MATH 050 level courses here. These students had a 58.4 percent success rate at the MATH 050 level. Of the 3,680 students, 1,593 or 43.3 percent also took MATH 070 level courses at Rio Hondo. The overall success rate for those 1,593 MATH 070 level students was 67.4 percent. Fully 1,491 or 93.6 percent of the 1,593 students had previously succeeded in MATH 050 level courses at Rio Hondo College. The success rate for those 1,491 students at the MATH 070 level was 69.1 percent.

Relative Success of Students with Prior Preparation At Rio Hondo Versus Elsewhere. For every level of Basic Skills Math students may be taking courses based on assessment and first placement in the courses, transfer of pre-requisite coursework from elsewhere, or succeeding in a pre-requisite course at Rio Hondo College. If one eliminates the students who did not succeed in the pre-requisite course at Rio Hondo, one can compare the relative success at the next level of students who took preparatory Math courses elsewhere with that of students who passed the pre-requisite course at Rio Hondo. The analysis checked six hypotheses:

- Students who passed MATH 020 at Rio Hondo and took MATH 030 at Rio Hondo passed MATH 030 at higher rates than students who did not take MATH 020 at Rio Hondo but took MATH 030 here;

- Students who passed MATH 020 and/or MATH 20 A, B, or C at Rio Hondo and took MATH 030 or MATH 30 A, B, C, or D at Rio Hondo passed the MATH 030 level at higher rates than students who did not take MATH 020 level courses at Rio Hondo but took MATH 030 level courses here;

- Students who passed MATH 030 at Rio Hondo and took MATH 050 at Rio Hondo passed MATH 050 at higher rates than students who did not take MATH 030 at Rio Hondo but took MATH 050 here;

- Students who passed MATH 030 and/or MATH 30 A, B, C, or D at Rio Hondo and took MATH 050 or MATH 50 A, B, C, or D at Rio Hondo passed the MATH 050 level at higher rates than students who did not take MATH 030 level courses at Rio Hondo but took MATH 050 level courses here;

- Students who passed MATH 050 at Rio Hondo and took MATH 070 at Rio Hondo passed MATH 070 at higher rates than students who did not take MATH 050 at Rio Hondo but took MATH 070 here;

- Students who passed MATH 050 and/or MATH 50 A, B, C, or D at Rio Hondo and took MATH 070 or MATH 70 A, B, C, or D at Rio Hondo passed the MATH 070 level at higher rates than students who did not take MATH 050 level courses at Rio Hondo but took MATH 070 level courses here.

While the cross-tabulation distributions for all but the first hypothesis were statistically significant according to Pearson chi-square values, and usually in the direction favored by the hypotheses, there was no strength in the correlations (i.e., Phi values were less than .10), with one exception. The last hypothesis was statistically significant (Pearson Chi-Square = 55.567, $p < .00$) and showed a weak correlation (Phi = .105, $p < .001$) of success at the MATH 070 level if one had succeeded at the MATH 050 level at Rio Hondo rather than elsewhere. The correlation reached the weak .105 level of strength when the potential impact on success rates of students who only took Math/Science Center courses was included (for both the MATH 050 and the MATH 070 levels). If students took the term length MATH 070 course (with or without any Math/Science Center courses), there was not even a weak correlation with MATH 070 success of having previously succeeded in MATH 050 at Rio Hondo as compared to taking Mathematics courses elsewhere. In particular, 65 percent of those who did not take MATH 050 at Rio Hondo succeeded in MATH 070, compared with 69 percent of those who succeeded in MATH 050 at Rio Hondo also succeeding in MATH 070. While the 69 percent success rate at the MATH 070 or MATH 070 A, B, C, and D held for those who had succeeded in MATH 050 or MATH 050 A, B, C, and D at Rio Hondo College, only 59 percent of students who took Math elsewhere succeeded in either MATH 070 or MATH 070 A, B, C, and D at Rio Hondo College. Including the Math/Science Center courses added 130 students and 68 MATH 070 successes to the group of Rio Hondo prepared students, but 248 students and only 9 MATH 070 successes to the group of students who had prepared elsewhere. Clearly the Rio Hondo prepared students who took advantage of the Math/Science Center courses at the MATH 050 and/or the MATH 070 levels made the difference in bringing the correlation to a level of weak significance.

One conclusion from these correlation checks is that, with the possible exception noted above, students get as good a preparation at Rio Hondo for the next Basic Skills Math courses as they do anywhere else, if they succeed in the Rio Hondo pre-requisite courses. When moving between MATH 050 and MATH 070 levels, Rio Hondo students may have a small advantage in achieving MATH 070 success, provided that the students who only attempt MSC courses at either or both levels are included in the statistical calculations.

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